

# CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH

J. D. DUNSHEE, M.D., Director

## Weekly Bulletin



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GUY P. JONES  
EDITOR

## *The Plague Situation\**

By W. H. KELLOGG, M.D., Chief, Bureau of Laboratories, Berkeley

It is just 40 years since the present pandemic of plague began with the appearance of an epidemic in Hong Kong and just 34 years since it reached California. Arriving in India from Hong Kong it found favorable conditions and soon after 1900 the deaths reached a million per year. Even now after nearly 40 years of continuous activity the deaths from plague in India are occurring at the rate of 3000 to 4000 per week. Considered in the light of the known history of plague there is nothing unusual in these facts, nor is there in the length of time it has been continuously present in California any ground for believing that it is dying out and will shortly disappear.

It is characteristic of plague that its period is very slow and the rise and fall of epidemics is measured in decades and centuries. Upon its appearance in a country it is sometimes years before its presence is manifested by any great mortality, and in the subsidence of a pandemic its final disappearance is interrupted by sporadic localized outbreaks. The long range periodicity of plague, as well as its persistence, is well shown in the history of plague in England where it finally disappeared in 1680 after an almost continuous presence for 136 years. The Great Plague of London occurred in 1665 with about 70,000 deaths, but there had been previous to that time and within the 136 year period five epidemics with from 10,000

to 35,000 deaths at intervals of 30, 10, 22, 11 and 30 years.

The following from Procopius of Caesarea, in his "History of the Persian Wars," describing the pandemic of the sixth century—which is the first authentic historical pandemic—is interesting in its parallelism with more modern appearances:

"It arose in Egypt with the inhabitants of Pelusium, then dividing spread one way through Alexandria and the rest of Egypt, the other into Palestine which borders on Egypt, and then traveled over the world always advancing with a progress marked by certain definite spaces of time. For it seemed to advance by a certain law and to demand a certain space of time in every country, discharging its venom against no one on the way casually, but spreading on this side and on that to the uttermost ends of the world as if it feared lest incautiously it should pass by any corner or recess upon earth. It spared neither island nor cave nor mountain top where man dwelt. If it passed over any place only slightly or mildly touching the inhabitants, it returned there afterwards leaving untouched the neighbors against whom it had spent its rage before and it did not depart from there before it made up the full measure of the dead in proportion to the amount of destruction which it had brought on its neighbors. Always beginning at the sea coast it spread into the interior. In the second year it reached Byzantium about the middle of the spring where, as it happened, I was staying."

\* Reprinted from March, 1935, Journal of the American Public Health Association.



The great epidemics of ancient times seem to have been of the bubonic form, although it must be remembered that historical accounts of plagues include all epidemic disease, typhus, smallpox, etc., as well as plague, and it is only the description of buboes by some of the writers that identify bubonic plague. Pneumonic plague might have occurred, but for authentic accounts of pneumonic plague epidemics we have only comparatively small outbreaks in recent years in Manchuria, in limited districts of India, and on a still smaller scale in California. There are, however, references seeming to indicate that pneumonic plague accompanied some of the bubonic outbreaks and therefore doubtless occurred alone.

Guy de Chauliac in his description of the plague at Avignon, which was part of the second historical pandemic in the fourteenth century, says:

"The plague commenced with us in January, it continued seven months during which time it appeared in two forms. During the first two months it was accompanied with a continuous fever and with a coughing of blood. All who were attacked died in three days. During the other months the continuous fever was accompanied with tumors and boils which appeared in the external parts of the body, chiefly in the arm pits and in the groin. Those who were thus attacked died in five days."

As with illness of the individual, the prognosis is of great interest and importance to him, so also with the commonwealth, when plague is endemic is a prognosis of interest. Reviewing the past history of the disease an attempt may be made to predict what the future has in store for California and for the rest of the nation. It soon develops, however, that about the only thing that is certain about plague is the uncertainty of its disappearance and that usually about a century is required for it finally to flicker out. This is the history of human epidemics. But how about the endemic foci where plague lies dormant during the intervals between epidemic or pandemic spread? The natural reservoir of plague is in wild rodents of squirrel or groundhog type and the historical foci are districts in Arabia along the Red Sea, in Mesopotamia, in Thibet, in Yunnan in China, and in Uganda in Africa. More recently endemic foci have been established in Manchuria from which the pneumonic epidemics of 1910 and 1916 originated, and in California where the native rodent concerned is the ground squirrel, *Citellus beechii*.

The rat as a carrier of plague seems to be subject to the rise and fall of epidemics the same as is his human associate. When plague disappears from a human population it leaves the rat population also,

but the enzootic does not exactly coincide with the epidemic. It usually precedes it and is likely to linger longer. The source of human bubonic outbreaks is the rat and the source of rat plague is doubtless contact with wild rodents in some endemic focus. The primary source of plague, therefore, is the wild native rodent and the distributor is the rat which travels in ships and visits all lands. The rat occasionally returns the infection to wild rodents in some new locality, thus establishing a new endemic focus. This happened in California shortly after the introduction of plague into San Francisco about 1900, and presumably the point of contact was in the vicinity of the Port Costa warehouses. At any rate squirrel plague was first found in that vicinity, and the enzootic soon reached large proportions.

The record of plague in California is as follows:

March, 1900—Bubonic plague appeared in San Francisco, principally in the Chinese colony, and a total of 121 cases with 113 deaths occurred over a period of 4 years.

May, 1907—Bubonic plague again appeared in San Francisco. The total number of cases over a period of 6 months was 160 and the deaths 78. This time it was not confined to Chinatown, but scattered over the whole city.

August, 1908—Plague proven to be present among the ground squirrels of Contra Costa County.

May, 1907, to December, 1918—Sporadic cases of human plague to the number of 11 with 5 deaths occurred in the counties of Alameda, Contra Costa, San Benito, Santa Clara, San Joaquin, and Stanislaus. Squirrel plague found to be present in the same counties as well as in Fresno, Monterey, San Luis Obispo, Santa Cruz, San Mateo, Merced, and San Francisco.

August, 1919—An outbreak of pneumonic plague in Oakland with 13 cases and 12 deaths.

1919 to 1924, inclusive—Six sporadic cases with 2 deaths occurred in Alameda, Monterey, San Benito, and Santa Cruz counties.

October, 1924—An outbreak of pneumonic plague in Los Angeles with 32 cases and 30 deaths.

November, 1924—Five cases of bubonic plague with three deaths in Los Angeles County.

1925 to 1933—Seven sporadic cases with 5 deaths in the counties of Los Angeles, Santa Cruz, Monterey, and Santa Barbara.

1934—One human case in Tulare County. Also a large epizootic among ground squirrels of Tulare and Kern counties, over 200 positive specimens being found among those sent to the laboratory. Furthermore, an epizootic was discovered among the ground squirrels of Modoc County in the northeastern corner of the state on the eastern side of the Sierras.



This chronology of plague in California shows that we have had two bubonic epidemics, the first in San Francisco from 1900 to 1904, and the second in San Francisco and Oakland in 1907 and 1908. We have had two pneumonic epidemics, the first in Oakland in 1919, and the second in Los Angeles in 1924. We have had in all 35 sporadic cases with 19 deaths, mostly in rural districts and of squirrel origin, nine counties being represented. Squirrel plague has been found in 19 counties.

The plague situation on the West Coast is of interest to health authorities throughout the country as will be appreciated by a consideration of what the possible answer is to certain questions which immediately present themselves: First, what is the probability of plague dying out before long? Second, what is the significance of ground squirrel infection? Third, is plague in California a menace to other states?

The answer to the first question is written in the history of plague, and from the brief references to that history already quoted in this paper it may be suspected that the chapter is not finished and may not be for many years to come. This is made all the more certain when it is remembered that there is every reason for believing that the historical epidemics and endemics were ratborne and in course of time they did come to an end, whereas plague has been kept alive continuously in particular habitats where the rodent concerned was not the rat but a wild native animal such as the marmot. In these localities plague has not, so far as anyone knows, ever completely disappeared. Such a focus now exists in the California ground squirrel.

In answer to the second question we find the most disquieting aspect of the whole problem. In rat plague pneumonia is not a common finding. Guinea pigs inoculated from rats rarely show lung involvement. In squirrel plague pneumonia is common. Guinea pigs inoculated from squirrels very frequently present a pneumonia. The Oakland outbreak of 13 pneumonic cases, which group included two nurses and two doctors, was started by contact with squirrels, the first man having been squirrel hunting just before his onset. His case was primarily bubonic (axillary) with pneumonia supervening. The Los Angeles epidemic is not so easily traced to squirrels although in the rodent survey following, both rats and squirrels were found infected. There would seem, therefore, to be some ground for the theory that pneumonic plague is the result of a development of a specific organ virulence, on the part of the prevailing strain of *B. Pestis* by passage through a particular species of rodent. In this connection Dr. Wu Lien Teh says:

The idea that the species of rodents involved in the epizootics might influence the character of subsequent epidemics is a very fascinating one. Especially it has to be considered if a close relation does exist between epizootics in certain wild rodents and human outbreaks of pneumonic plague. In fact, a world-wide study of the disease both in rodents and in man as undertaken by our staff within recent years has yielded many data supporting this view. On the other hand, in some countries where only ordinary rats are involved the incidence of lung pest is conspicuous also. But before reaching any final conclusions the following points should be considered: (1) Though ordinary rats are sometimes found to be the original source of pneumonic outbreaks, in many instances the local rodents were not involved, the disease having been imported from outside by human agency, namely, by travelers incubating the disease. (2) How long has the disease existed in the local rats? In some plague areas with rat epizootics pneumonic plague was frequent soon after the introduction of infection but became rarer afterwards. One might consequently suggest that the longer the infection continues among ordinary rats the less chance there is for pneumonic plague to appear in man.

Finally, the significance of ground squirrel infection, leaving out of consideration any bearing it may have on the type of human plague, lies in the fact that a new endemic focus has been established and these endemic foci, constituted as they are of wild rodent infection, are, so far as anyone knows at present, permanent and everlasting.

(Continued in next issue)

The secret of happiness is not in doing what one likes but in liking what one has to do.—James M. Barrie.

Looking around on the noisy inanity of the world—words with little meaning, actions with little worth, one loves to reflect on the great Empire of Silence, higher than all stars; deeper than the Kingdom of Death. It alone is great; all else is small.—Carlyle.

#### MORBIDITY

Complete Reports for Following Diseases for Week Ending June 8, 1935

##### Chickenpox

915 cases: Alameda County 5, Alameda 32, Albany 5, Berkeley 51, Emeryville 1, Hayward 1, Oakland 59, Piedmont 2, San Leandro 10, Contra Costa County 9, Pittsburg 3, Richmond 2, Walnut Creek 1, Fresno County 1, Fresno 18, Sanger 2, Selma 1, Calxico 1, Kern County 3, Lake County 1, Los Angeles County 46, Alhambra 1, Arcadia 2, Avalon 13, Azusa 1, Beverly Hills 16, Claremont 2, Covina 1, Culver City 22, Glendale 8, Inglewood 1, La Verne 3, Long Beach 12, Los Angeles 113, Pasadena 20, Pomona 9, Redondo 1, San Gabriel 1, San Marino 1, Santa



Monica 8, Whittier 1, Lynwood 4, South Gate 1, Monterey Park 8, Maywood 1, Bell 2, Gardena 1, Marin County 1, San Rafael 2, Monterey County 5, Salinas 1, Orange County 17, Anaheim 6, Brea 1, Fullerton 1, Huntington Beach 1, Santa Ana 14, Laguna Beach 4, Riverside County 2, Sacramento 17, Ontario 7, San Bernardino 1, San Diego County 2, Coronado 1, National City 2, San Diego 46, San Francisco 158, San Joaquin County 8, Stockton 30, San Luis Obispo County 1, San Mateo County 2, Burlingame 1, Daly City 2, Redwood City 1, San Carlos 1, Santa Barbara County 8, Santa Barbara 6, Santa Clara County 4, Palo Alto 5, San Jose 4, Santa Cruz County 43, Sonoma County 1, Stanislaus County 1, Tehama County 1.

#### Diphtheria

31 cases: Oakland 2, Imperial County 1, Los Angeles County 4, Los Angeles 10, Redondo 2, Monterey 1, Napa County 1, Santa Ana 1, San Diego County 1, El Cajon 1, Oceanside 3, San Francisco 1, Santa Barbara 1, Santa Rosa 1, Turlock 1.

#### German Measles

868 cases: Alameda County 8, Alameda 1, Berkeley 7, Oakland 93, San Leandro 27, Chico 1, Contra Costa County 11, Concord 4, Pinole 1, Fresno County 32, Selma 1, Lake County 1, Los Angeles County 51, Alhambra 5, Beverly Hills 1, Compton 2, Culver City 1, Glendale 1, Huntington Park 2, Inglewood 2, Long Beach 13, Los Angeles 77, Monrovia 1, Montebello 1, Pasadena 36, Pomona 1, San Gabriel 1, San Marino 2, Sierra Madre 2, South Pasadena 1, Whittier 2, Lynwood 1, South Gate 6, Maywood 2, Bell 1, San Rafael 1, Fairfax 1, Monterey 1, Pacific Grove 1, Napa County 1, Nevada County 1, Orange County 11, Brea 1, Orange 1, Santa Ana 28, La Habra 1, Laguna Beach 1, Riverside County 3, Corona 2, Riverside 7, Sacramento 48, Ontario 3, San Diego County 12, La Mesa 2, San Diego 42, San Francisco 119, San Joaquin County 8, Lodi 2, Stockton 9, San Mateo County 1, Burlingame 1, Redwood City 3, San Bruno 1, San Mateo 1, Menlo Park 1, Lompoc 1, Santa Clara County 4, Mountain View 1, Palo Alto 38, San Jose 51, Sunnyvale 8, Santa Cruz County 18, Santa Cruz 1, Shasta County 3, Modesto 1, Turlock 4, Riverbank 3, Ventura County 3, Yolo County 17, Woodland 2.

#### Influenza

33 cases: Los Angeles County 4, Huntington Park 1, Los Angeles 14, Whittier 2, San Francisco 4, San Joaquin County 2, Siskiyou County 3, Stanislaus County 1, Turlock 2.

#### Measles

1636 cases: Alameda County 9, Alameda 2, Albany 1, Berkeley 36, Emeryville 1, Oakland 54, San Leandro 2, Butte County 1, Chico 7, Calaveras County 1, Angels Camp 2, Colusa County 1, Colusa 3, Contra Costa County 11, Concord 4, Pittsburg 3, Richmond 2, Walnut Creek 4, Del Norte County 9, Crescent City 21, Fresno County 5, Fowler 1, Fresno 29, Sanger 3, Kern County 13, Bakersfield 4, Taft 6, Lemoore 1, Los Angeles County 32, Alhambra 3, Beverly Hills 13, Burbank 30, Compton 4, Glendale 4, Huntington Park 2, Inglewood 1, La Verne 1, Long Beach 114, Los Angeles 87, Monrovia 2, Pasadena 15, Redondo 2, San Gabriel 3, Santa Monica 1, Whittier 2, Lynwood 9, Monterey Park 2, Madera 4, Fairfax 1, Alturas 1, Monterey County 5, Salinas 3, Napa 1, Nevada County 1, Orange County 109, Anaheim 23, Fullerton 27, Huntington Beach 2, Newport Beach 7, Orange 17, Santa Ana 107, La Habra 6, Placentia 1, Tustin 15, Roseville 6, Riverside County 23, Beaumont 8, Riverside 7, Sacramento County 1, Sacramento 120, Ontario 4, San Bernardino 1, Escondido 1, National City 1, San Diego 5, San Francisco 157, San Joaquin County 69, Lodi 19, Manteca 1, Stockton 16, San Luis Obispo County 3, San Mateo County 1, Burlingame 1, San Mateo 3, Santa Barbara County 5, Lompoc 23, Santa Barbara 1, Santa Clara County 9, Gilroy 1, Mountain View 3, Palo Alto 18, San Jose 105, Willow Glen 1, Santa Cruz County 5, Santa Cruz 2, Watsonville 8, Solano County 2, Vallejo 1, Sonoma County 2, Petaluma 3, Santa Rosa 7, Stanislaus County 25, Turlock 23, Riverbank 4, Tehama County 6, Tulare County 3, Lindsay 2, Tulare 3, Tuolumne County 1, Ventura County 3, Oxnard 1, Yolo County 18, Woodland 11.

#### Mumps

329 cases: Alameda County 1, Alameda 9, Berkeley 4, Hayward 3, Oakland 52, San Leandro 17, Contra Costa County 8, Fresno County 1, Fresno 1, Selma 1, Los Angeles County 9, Azusa 2, Burbank 5, Claremont 3, Glendale 2, Huntington Park 1, Long Beach 6, Los Angeles 21, San Gabriel 1, South Pasadena 1, Torrance 3, South Gate 1, Monterey County 1, Nevada County 4, Orange County 1, Plumas County 3, Riverside County 1, Beaumont 1, Sacramento 16, San Diego County 1, National City 2, San Diego 15, San Francisco 17, San Joaquin County 18, Lodi 15, Stockton 19, Tracy 1, San Luis Obispo County 7, Arroyo Grande 2, San Luis Obispo 2, Burlingame 1, Santa Barbara County 1, Santa Maria 13, San Jose 1, Santa Cruz 7, Watsonville 1, Shasta County 3, Riverbank 2, Tehama County 5, Yolo County 10, Woodland 7.

#### Pneumonia (Lobar)

62 cases: Berkeley 5, Los Angeles County 4, Beverly Hills 1, Glendale 1, Long Beach 1, Los Angeles 26, Santa Monica 1, Santa Ana 3, Riverside County 1, Sacramento 3, San Diego 3, San Francisco 6, San Joaquin County 4, Lodi 1, Stockton 1, Tracy 1.

#### Scarlet Fever

186 cases: Alameda County 1, Alameda 3, Oakland 13, San Leandro 2, Chico 1, Pinole 1, Richmond 1, Fresno County 1, Imperial County 1, Kern County 3, Los Angeles County 6, Alhambra 1, Azusa 1, Burbank 1, Compton 2, Glendale 1, Huntington Park 1, Long Beach 1, Los Angeles 30, Pasadena 4, Pomona 1, San Fernando 1, San Marino 1, Monterey Park 6, Monterey County 1, Salinas 1, Grass Valley 1, Orange County 6, Anaheim 2, Santa Ana 1, Tustin 1, Riverside County 1, Beaumont 2, Sacramento County 1, Sacramento 16, San Bernardino County 2, Chino 1, Ontario 1, Redlands 1, San Bernardino 1, San Diego County 3, El Cajon 1, San Diego 10, San Francisco 20, San Joaquin County 6, Stockton 2, San Luis Obispo County 1, San Mateo 3, Santa Clara County 1, Gilroy 1, San Jose 4, Fairfield 1, Sonoma County 1, Petaluma 3, Tulare County 1, Sonora 2, Ventura 1, Yolo County 1, Woodland 1.

#### Smallpox

29 cases: Chico 1, Los Angeles County 7, Inglewood 1, Los Angeles 8, Willow Glen 1, Santa Cruz County 3, Watsonville 4, Tulare County 2, Tuolumne County 1, California 1.\*

#### Typhoid Fever

12 cases: Imperial County 4, Los Angeles 1, Monterey County 2, Napa County 1, San Joaquin County 2, Modesto 1, California 1.\*

#### Whooping Cough

201 cases: Albany 2, Berkeley 4, Hayward 1, Oakland 16, Piedmont 1, Los Angeles County 9, Burbank 1, Glendale 1, Inglewood 1, Long Beach 1, Los Angeles 11, Pasadena 1, Redondo 3, San Fernando 2, Santa Monica 3, Torrance 1, South Gate 3, San Rafael 3, Orange County 4, Anaheim 5, Fullerton 2, Huntington Beach 6, Santa Ana 2, Roseville 2, Plumas County 1, Sacramento 3, Ontario 1, San Bernardino 1, San Diego County 4, National City 9, San Diego 15, San Francisco 58, San Joaquin County 2, Stockton 4, San Luis Obispo County 3, Paso Robles 5, San Luis Obispo 1, San Bruno 2, Santa Barbara 3, Palo Alto 4.

#### Meningitis (Epidemic)

4 cases: Los Angeles 1, Sacramento 1, Tulare County 1, Ventura 1.

#### Dysentery (Amoebic)

4 cases: Los Angeles 1, Ontario 1, San Joaquin County 1, Tracy 1.

#### Dysentery (Bacillary)

3 cases: Los Angeles 1, San Francisco 1, Petaluma 1.

#### Pellagra

6 cases: Berkeley 1, Los Angeles 3, San Francisco 1, San Luis Obispo 1.

#### Poliomyelitis

9 cases: Los Angeles County 1, Los Angeles 6, Sacramento 1, Oxnard 1.

#### Trachoma

One case: Los Angeles County.

#### Paratyphoid Fever

3 cases: San Francisco 1, Santa Barbara County 2.

#### Rocky Mountain Spotted Fever

2 cases: Lassen County 1, Alturas 1.

#### Food Poisoning

59 cases: Inglewood 4, Madera County 51, San Francisco 4.

#### Undulant Fever

5 cases: Huntington Park 1, Los Angeles 1, Manhattan 1, Pasadena 1, San Bruno 1.

#### Tularemia

One case: Los Angeles.

#### Septic Sore Throat (Epidemic)

One case: Santa Barbara County.

#### Rabies (Animal)

28 cases: Calaveras County 1, Los Angeles County 4, Compton 2, Culver City 1, Inglewood 1, Los Angeles 9, San Diego 10.

\* Cases charged to "California" represent patients ill before entering the State or those who contracted their illness traveling about the State throughout the incubation period of the disease. These cases are not chargeable to any one locality.